FLAME SPECTROSCOPY

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Fig. 17-11 Potential energy curve and vibration levels of a diatomic molecule (OH in its fundamental state, after [28]).
Fig. 18-7  Vibrational energy levels diagram of $A^3\Sigma$ and $X^3\Pi$ states, and transitions of OH molecule with Morse potential curves.
Fig. 17-1 Definition of \( \Lambda \).

a number \( \Sigma \) through the relation \( L \).
Fig. 17-3 Molecular electronic multiplet of a $^3\Pi$ (A = 1; S = 1) state. (a) Vector diagram. (b) Energy level diagram: in the middle, without interaction of A and S; to the left: with interaction and A positive (normal multiplet); to the right: with interaction and A negative (inverted multiplet).
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Case (a)

Case (b)
Fig. 17-8 First rotational levels of the OH radical in its ground state showing the $N$ numbering (vibrational level: $v = 0$).
Fig. 17-22  Comparison of case (a) and case (b) for a doublet state ($^2\Pi; S = \frac{1}{2}; 2S + 1 = 2$). (The separation between the $^2\Pi_{1\frac{1}{2}}$ and $^2\Pi_{0\frac{1}{2}}$ levels in case (a) is arbitrary and the $\Lambda$-doubling has not been indicated.)
Fig. 17.23 First rotational levels of a $^3\Pi_{1\frac{1}{2}}$ state. (a) Without taking account of the Λ-type doubling. (b) With Λ-type doubling (very exaggerated).

The Λ splitting constant $a$ is $a_l$. 
Fig. 17-14 (a) Transitions and (b) schematic representation of a vibration-rotation band of a diatomic molecule in a \( \Sigma \) state (neglecting the variation of the rotational constant \( B \) with the vibration and the centrifugal stretching).
\[ \Delta J = J' - J = 0 \]

Fig. 17-17 Transitions and schematic representation of a vibration-rotation band of a diatomic molecule in a \( \Pi_{1\Sigma} \) state (\( \Lambda = 1; \Sigma = \frac{1}{2}; \Omega = 1 \frac{1}{2} \)).
Fig. 17.25 Energy level diagram showing the twelve kinds of transitions giving rise to the twelve branches of a $^3\Sigma^+ \rightarrow \Pi$ (case a) band. (The spin splitting of the $^3\Sigma^+$ state and the $\Lambda$-doubling of the $^\Pi$ state have been very exaggerated.)
Fig. 17-24 Energy level diagram showing the ten transitions giving rise to the ten branches of a ΣΣ - ΣΠ (case b) band. (The dotted transitions (ΔN = +2 or −2) do not occur in a strict case (b). The spin splitting and the Λ-doubling of the ΣΠ state have been very exaggerated.)